REPORT

ON THE

Aligarh Agricultural Station,

IN THE

UNITED PROVINCES OF AGRA AND OUDH,

FOR THE YEAR ENDING JUNE 30th, 1907.

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From

W. H. MORELAND, Esq., C.I.E., I.C.S.,

Director of Land Records and Agriculture,

United Provinces,

To

The CHIEF SECRETARY to GOVERNMENT,

United Provinces.

Dated Cawnpore, the 26th of November 1907.

Sir,

I have the honour to submit the report on the Aligarh Agricultural Station for the year 1906-1907. The report has been written by Mr. J. M. Hayman, Deputy Director of Agriculture: the figures have been checked after printing.

2. The delay in submission is due to the press of practical work on cotton which occupies the Deputy Director's time during the hot weather and the early part of the rains.

I have the honour to be,

Sir,

Your most obedient servant,

W. H. MORELAND,

Director.

CONTENTS.

	Page.
CHAPTER I.—*The principal objects of the station*	1
CHAPTER II.—*Situation, area and soil*	2
CHAPTER III.—*Trial of different varieties of cottons* :—	
(1) American acclimatized cottons	3
(2) Local cottons	*ib.*
(3) Egyptian cottons	4
CHAPTER IV.—*Selection of acclimatized American and Local cotton* :—	
(1) American acclimatized cotton	4
(2) Local cotton	6
CHAPTER V.—*Miscellaneous* :—	
(1) Establishment of sub-centres for supplying implements and giving advice.	6
(2) Cotton seed distribution	*ib.*
(3) The possible improvement of usar lands such as exist at the Aligarh Agricultural Station and at the Gursikran reserve by boring through the underlying impervious layer and planting trees	*ib.*
APPENDIX A.—Character of the season and rainfall.	
Do. B.—Map.	

ERRATA *to Report on the Agricultural Station, Aligarh, for the year ending June 30th*, 1907.

1 Page 2, in the statement, against 'available phosphoric acid' under the column of 'Barren land-soil 288-07' *read* ·0135 *for* 0135.

2 „ 4, in the statement under the column of 'outturn' against 'Tihaiya' of Aligarh, *read* 605 *for* 6C5.

3 „ 4, in the column of 'percentage of rui' against 'machine ginned cotton,' *read* 33·6 *for* 33 6.

4 „ 5, omit 2nd line of the statement altogether.

5 „ 5, in the 4th line under the column of Plant number *read* 9 *for* 7.

6 „ 5, in the remark column against number 16 insert comma between 'cotton' and 'seed' and omit full stop after 'seed'.

7 „ 5, under the column of weight in grains-Lint against number 21, *read* 432·75 *for* 43275.

8 „ 5, under the column of weight in grains-seed, *read* 1202·75 *for* 120275.

9 Appendix A—Rainfall statement—against 7th August 1906, *read* ·23 *for* ·23.

Report on the Aligarh Agricultural Station for the year ending 30th June 1907.

CHAPTER I.

PRINICIPAL OBJECTS OF THE STATION.

Aligarh, being the centre of one of the best cotton growing tracts in this Province, has been selected as a most suitable centre for the introduction of a better stapled cotton and for purposes of testing, growing and keeping up a supply of seed from specially selected stock. This work alone properly carried out must mean eventually a considerable staff and a large amount of detailed work. In fact it must mean real selection if any impression is to be made on the very large area of cotton which is sown in the surrounding districts.

Supposing that the acclimatized cotton should eventually find a place in the district, the first procedure would seem to point to improving and keeping up a reliable stock of this cotton, the superior qualities of which are evident. While the area being more limited, the possibility of maintaining a supply of seed sufficient to produce an enduring and general impression lies more within the compass of the present available agency to carry out such work.

With regard to the country cotton, it hardly seems likely to open up such a fair field of improvement as the establishment and maintenance of the naturally better American variety would do. The local cotton is distinctly a coarse variety in the main—coarser, for instance, than that of Bundelkhand, but having a high percentage of lint to seed—a character which is fully recognised by buyer and seller and which both aim at obtaining. This hardly implies that there has been any systematic selection by the cultivator, but amongst a large number it is evident that this quality has received some attention and is continually brought home by the extent it rules the price. Thus even by indifferent methods through long duration an average may have been obtained which it will prove difficult to surpass and maintain. Hence the best lines of improvements would seem to lie in obtaining some slight improvement in quality without losing the natural high percentage and white colour (such as the single tree mentioned in the body of the report as having been selected for future trial) and which, if its qualities are maintainable, would have an enhanced value. Beyond this it does not seem advisable to aim, as it must be borne in mind that the existing local cotton meets a special demand in the Bombay market. In fact in my opinion it is not possible to go further, for one might as well try and transform the proverbial sow's ear as turn this cotton into a silky and longer stapled one.

On the other hand, to return to the question of the American acclimatized cotton, there is the ever present fact that anything good in this country seems but an opportunity to adulterate, with the result that the good name gradually goes and the price with it. Thus with Hinganghat cotton : while allowing full weight to the fact that the coarser introduced cottons were more hardy and productive and found a strong market, yet from what I gather from mill owners and buyers something may be laid to the facilities which railways have given of transferring mixable cottons, with the result that the quality of a great deal of the Hinganghat gradually declined and with this, to some extent, the good name of cotton sold as such.

Another question engaging the attention of the station is the supply of implements. The want of mechanical knowledge is evident, but while people are often unwilling or unable to purchase, the fact that they often gladly and willingly take advantage of being able to hire is well known. Consequently steps are being taken, as detailed in the report, to meet these conditions and requirements, which possibly in the future, if they find sufficient extension, will be worth taking up by private firms.

Other matters will receive attention with time, and as occasion arises.

CHAPTER II.

SITUATION, AREA AND SOIL.

The agricultural station is situated about two miles from the East Indian Railway Station on the Aligarh-Ramghat road. The land has been acquired by Government and was taken possession of on the 16th of May 1906. The whole area in possession is 88·06 acres. About 8 acres (including a mango grove) have been set apart for the necessary buildings. The Farm Bailiff's quarters, cattle shed, godowns, &c., have been arranged for under my supervision and have been completed during the year. A bungalow and office are being constructed by the Public Works Department.

Soil.—The soil is a fair sample of the light reddish loam which occurs over a large portion of the district and is supplied for irrigation purposes with water from the Koil distributary. Most of the land when acquired was in poor condition, uneven and not very capable of being irrigated easily throughout, and a considerable amount of time has been spent in laying the land out and in constructing central and lateral water courses from which the water can be distributed with greater convenience and from which different methods of raising canal water can be demonstrated.

The following shows the complete analysis of the soil carried out by Dr. Leather, Imperial Agricultural Chemist to the Government of India :—

	Aligarh, lowlying land near Tank.		End of parallelogram near building.		Near Rajbaha.		Barren land.	
	Soil 282—07.	Sub-soil 283—07.	Soil 284—07.	Sub-soil 285—07.	Soil 286—07.	Sub-soil 287—07.	Soil 288—07.	Sub-soil 289—07.
Carbon dioxide	·03994	·119	·0792	·0599	·0597	·1197	·4344	·4355
Calcium carbonate	·0909	·2705	·1802	·1363	·1360	·2787	·9884	·9909
Organic nitrogen	·052	·041	·033	·033	·034	·028	·027	·020
Organic carbon	·367	·275	·201	·218	·240	·218	·144	·126
Available phosphoric acid ...	·0299	·0191	·0264	·0198	·0319	·0191	0135	·009
Available potash	·0163	·0139	·0070	·0062	·0077	·0054	·0062	·0124

Composition of the same soil samples in regard to the percentage of salts.

	Aligarh—lowlying land near Talab.		Aligarh—end of parallelogram near building.		Aligarh—land near Rajbaha.		Aligarh—barren land.	
	Soil 282—07.	Sub-soil. 283 07.	Soil 284—07.	Sub-soil 285—07.	Soil. 286—07.	Sub-soil 287—07.	Soil. 288—07.	Sub-soil 289—07.
Sodium carbonate	...	...	...	...	·003	·016	·192	·260
Sodium sulphate	...	...	·001	·005	·006	·012	·013	·014
Sodium chloride	·001	·009	·012	·025	·009	·012	·018	·023
Magnesium sulphate	·004	·003	·007	·014	...	...	...	...
Magnesium chloride	·021	·023	...	...	...	...	...	...

CHAPTER III.

TRIAL OF DIFFERENT VARIETIES OF COTTON.

(1) **American acclimatized cotton.**—Seed from varieties acclimatized for many years at the Cawnpore Agricultural Station was sown with irrigation. The outturns are given in the attached statement. In considering these outturns it is necessary to bear in mind that though the soil is suitable it had only just been taken possession of, operations were hurried, and the land was in poor cultivation, uneven and subject to water-logging in places, as specially shown in the very low outturns of certain plots, and received no manure. It is not to be supposed that a superior class of cotton will show to the best under these conditions. Those cultivators to whom seed was distributed were invariably advised to sow on land in good fair condition. Consequently their results seem generally to have given satisfaction. For the department it was desirable to sow in any case without waiting the improvement of the land, in order to commence selection and the supply of seed, as long as good healthy trees and sound seed could be obtained. In the statement attached it will be seen that on good fair sized areas of half an acre in three cases outturns of 500 to 600 lbs. kapas were obtained.

Some 4,000 lbs. of *rui* grown in the Aligarh district is now being spun and made into cloth. Although the results are not yet complete the indications are that they will be favourable to the continued growth of the cotton.

Acreage outturn of American cotton grown at the Aligarh Farm (1906-1907.)

Serial No.	Name of variety.	Outturn of good *kapas per acre in lbs. grown on the following sized plots.						Average outturn of good kapas per acre.	Result of ginning average weight per acre in lbs.		Percentage of *rui*.	Remarks.
		½ acre.	¼ acre.	½ acre.	1·74 acre.	2·31 acre.	1·98 acre.		Rui.	Seed.		
1	Cook's long staple	470	194	448	...	...	...	371	103	258	28·5	Some of these plots suffered from want of germination at sowing and afterwards from water-logging to some extent.
2	Watagodu ...	604	...	302	...	...	...	453	137	310	30·6	
3	Farm variety No. 1.	566	...	314	483	...	...	454	133	312	29·8	
4	Allen ...	509	..	286	...	398	...	398	118	270	30·4	
5	Hybrid ...	397	165	367	...	...	...	310	84	217	27·9	
6	Mixed American	227	...	...	...	...	384	305	91	207	30·5	

* The bad cotton which was practically of little use was picked separate and has not been included in this statement.

(2). **Local cotton.**—Some eight plots were sown chiefly for purposes of selection and also for examining the local cottons. These included the so-called *Tihaiya* and *Bakand* obtained respectively from Gursikran and the village of Akhaipur (the latter considered locally somewhat famous for cotton). Neither samples of seed were pure to the yellow *(Tihaiya)* and white *(Bakand)* flowered types generally referred to under these names and it is doubtful if they are ever sown absolutely separately, some preponderance of trees with one or other form of flower being rather the case. The outturns of these two cottons are good. They were sown under better moisture condition than the American and their germination was better, the land more level and the plots smaller. The machine ginned cotton suffered rather under the conditions of the American cotton. And it appears that the lack of germination was due rather to want of moisture at sowing time than to any great inferiority of the seed.

The outturns are given in the attached statement.

Acreage outturn of country cottons grown at the Aligarh Farm (1906-1907).

Serial No.	Name of variety.	Outturn of good Kapas per acre in lbs. grown in the following sized plots.		Average outturn of good Kapas per acre.	Result of ginning average weight per acre in lbs.		Percentage of *rui*.	Remark
		$\frac{1}{10}$ Acre.	$\frac{1}{10}$ Acre.		Rui.	Seed.		
1	Tihaiya of Aligarh	605	616	610	226	364	38·3	
2	Akhaipur ...	569	598	583	216	351	38·0	
3	Machine ginned cotton.	492	348	420	136	268	33 6	
4	Machine ginned cotton.	487	412	450	147	291	33·5	Suffered from want of moisture at sowing time in much the same way as some of the American cotton.

(3). **Egyptian Cottons.**—Seed of four varieties, *viz.*, *Abbasi*, *Metaffifi*, *Asmani* and *Yunnowitch*, received at Aligarh on 12th June 1906 from the Deputy Director of Agriculture, Bombay, was sown on 16th, 18th and 20th June 1906, one small plot within the shade of some trees, the others in the open. The seed, except the *Abbasi*, had been badly injured by some insect and the germination was poor. While the plants were quite young they became attacked by some disease which later on continued to spread to plants which had at first escaped. A break in the rains from August 24th to September 4th appeared to be particularly favourable to the spread of the disease, practically carrying off all the remaining plants except those within the shade of the trees. These had remained fairly healthy up to the third week of August when the disease began to increase, but to the end these plants were less affected and produced a little lint. For Egyptian cotton the seed was sown rather late, but it is quite evident that Aligarh is not likely to prove a suitable place for its cultivation.

CHAPTER IV.

SELECTION OF AMERICAN AND LOCAL COTTON.

(1). **American acclimatized cotton.**—From an area of about eleven acres twenty-eight plants were selected in the field. The final selection and valuations are contained in the attached statement The primary selection was based on boll productiveness and well developed trees. The lint from each plant was collected separately and in the end was carefully examined.

There are so many points which enter into the quality of a cotton that it requires not only a very careful examination, but often a practical test—or rather many—before one can decide on the final characters to be selected for the best strain. Thus a strain possessing many desirable qualities may admit generally of only a variation in staple of $\frac{1}{8}$ of an inch in working and it may seem advisable to select on these lines if waste and breaking in working are to be avoided, with the result that other qualities in part must be subservient to this. Yet on the other hand it might be found (although evenness of staple must always tell, other points being equal) that a cotton discarded on these lines by reason of greater variation of staple—in practice on account of some greater convolution of the ultimate fibres or some other cause of tenacity and inseparability—was able to be worked without waste and breaking, and at the same time possessed some qualities superior to the first, making it a more desirable cotton and hence of enhanced value and likely to be in greater demand. But the most important point of all is that the strain selected should reproduce a progeny true to type in productiveness, in percentage of lint to seed and really lasting in character, without which selection becomes a mere phrase and work, on a large scale, time and money thrown away. The importance of a careful choice in the final selection of a strain on which success is to depend therefore becomes apparent.

Standard of selection.—A length of staple $\frac{7}{8}$ to one inch has been taken as the best standard combined with a fair percentage of lint to seed and productiveness a few other trees varying from this standard have been retained until more is learnt about the parentage from a study of the progeny.

Result of the examination of cotton of the finally selected plants from the crop of 1906-07, grown at Aligarh.

Plant number.	Field number.	Name of variety.	Length of lint in inches.	Colour of lint.	Softness.	Strength.	Absence of short stuff.	Evenness.	Total.	Weight of kapas in grains.	Weight in grains.		Percentage of lint to seed.	Remarks.
		Maximum marks :—		3	7	7	6	7	30		Seed.	Lint.		
1	238	Mixed American.	$\frac{7}{8}$" to 1"	3	6	5	5	4	23	1180·50	825·75	354·75	30·05	
2	238	Do. ...	$\frac{1}{2}$" to $\frac{5}{8}$"	3	5	4	3	3	18	1255·50	838·75	416·75	33·19	Should have been cut out instead of No. 20.
3	238	Do. ...	$\frac{3}{4}$"	3	6	5	4	4	22	1047	728·75	318·25	36·40	Short in fibre but kept in on account of high percentage of lint.
7	238	Do. ...	$\frac{3}{4}$" to $\frac{7}{8}$"	3	5	5	4	5	22	1864·25	1257·25	607	32·56	
11	$\frac{239}{1}$	Cook's long staple.	$\frac{7}{8}$" to 1"	3	5	5	5	5	23	1792·25	1273·22	519	28·96	
12	$\frac{239}{1}$	Do. ...	$\frac{3}{4}$" to 1"	3	6	5	4	6	24	2191·75	1473	718·75	32·79	
13	$\frac{242}{1}$	Do. ...	$\frac{7}{8}$" to $1\frac{1}{16}$"	3	6	6	5	6	26	1348·75	936	412·75	30·60	
16	$\frac{242}{2}$	Watagodu ...	$\frac{7}{8}$" to 1"	3	6	6	5	6	26	1654·25	1102·75	551·50	33·34	A desirable cotton seed, small comparatively.
19	$\frac{242}{3}$	Farm variety No. 1.	$\frac{7}{8}$" to 1"	3	5	4	3	6	21	1320·75	967	353·75	26·78	
21	$\frac{242}{4}$	Allen ...	$\frac{7}{8}$" to 1"	3	5	4	4	4	20	1334·75	902	432·75	32·42	
25	$\frac{243}{5}$	Hybrid ...	1" to $1\frac{1}{8}$"	3	5	5	5	6	24	1672·75	1202·75	470	28·10	
26	$\frac{243}{5}$	Do. ...	$\frac{5}{8}$" to 1"	3	5	5	4	6	23	1651·5	1080	571·5	34·60	

Note.—The weight of Kapas does not in all cases represent the actual outturn from a tree, as some trees were selected after the first picking.

(2) Local cotton.—I have examined the cotton of this district and find that it consists generally of a greater proportion of coarser, whiter and heavier linted cotton than that of Bundelkhand. Both yellow and white flowered varieties are present as elsewhere, the yellow generally being known as *Tihaya* and the white as *Bakand*. They are sown mixed in a varying proportion ; the yellow is generally softer, the white more harsh and with a larger percentage of lint to seed. A few trees of superior lint but poorer percentage of lint to seed occur. Out of all the trees examined only one seemed specially worthy of preserving. This combined softness, good colour and good percentage of lint to seed, and was valued at 4 annas per maund above the usual good samples of cotton from this district.

CHAPTER V.

MISCELLANEOUS.

(1) Establishment of sub-centres for supplying implements and giving advice.—Besides the central station at Aligarh two sub-centres (a third is under arrangement) have been established for the supply of implements &c., one at Chirooli and the other at Gojia. They will be visited from time to time by an official of the department who will demonstrate the work of implements, receive orders, give them out on hire or for trial and look after the necessary repairs. As far as possible a trained ploughman will be sent to purchasers for two or three days in order to instruct their servants and to help them over the first difficulties in the use of the implements. Of the two sub-centres Chirooli is about twelve miles from Aligarh and is the centre of *paunda* and *ukh* growing villages, with canal irrigation, where chain-pumps and ploughs are likely to be useful. Gujia is situated near Mursan, in the Hathras tahsil. It does not offer the same opening as the crops are less secure, and there is not the same incentive to labour.

In addition to the demonstration at the sub-centres implements were exhibited at the Aligarh and Meerut shows, and are always on view at the Aligarh Agricultural Station.

Advice has been given from time to time both personally and by correspondence ; and in a few cases medicine for simple wounds of cattle in the vicinity of the station has been dispensed.

(2) Cotton seed distribution.—Eleven and-a-half maunds of American acclimatized cotton seed sufficient to sow some 60 acres was distributed. Out of this 10 maunds were given to the cultivators of the Aligarh Court of Wards through H. J. Smith, Esq., the special Manager, but in spite of receiving it through a well-known channel a good deal of doubt and distrust existed at the time and probably not more than 20 acres were sown.

According to the arrangement the produce was brought to the agricultural station and purchased by the department at Rs. 26 per maund for *rui* and Rs. 8 per maund for *kapas*, which is in accordance with the prices received by this department for cottons of this variety. The country *rui* was selling at Rs. 16 and *kapas* at Rs. 6 per maund of 82 lbs. at the same time. All the cotton was brought in ginned, and the seed retained by the cultivators. If this indicates that the seed was retained for sowing purposes a very much larger area will be put under crop from the same source ; to which may be added a considerable amount of seed distributed this year by the department the demands for which were greater than the supply.

(3) The possible improvement of usar lands such as exist at the Aligarh Agricultural Station and at the Gursikran reserve by boring through the underlying impervious layer and planting trees.—The large area of permanent barren lands in these Provinces is well known. The possibility of any sort of reclamation seems to lie at zero point. The above usar area was reserved some years ago for the purpose of carrying out experiments for their reclamation as culturable land or for forming them into reserves for fodder and timber. So far, owing to many difficulties, experiments have been practically a failure, the only possibilty of doing anything appearing to be that of sowing the seed of such trees as *Babul* and *Dhak* and letting them take their chances, without going to any expense, in such patches of ground which the presence of Dub grass indicates as less affected than the rest and to utilize any grass that grows as fodder.

The cause of barrenness in the above area is evidently due to an impervious layer lying a few feet below the surface. It is equally evident that for the purposes of planting trees with any certainty of success an exit must be made through this layer both for root development and drainage. The necessity of attempting to do so was apparently recognized in the past and found expression ten years ago in what has been called the deep *thala* system. But the fault with this was that it did not go far enough or, rather, deep enough. In fact the real difficulty no doubt recognized at the time was that to do so would lead to a greater labour and expense than the result could possibly pay for, for not only is there the time and cost of digging so deep a hole but the still more difficult task of filling with good earth so deep and at the same time so wide a pit necessary for a man to dig in. The experience of boring wells in Western Canada many years ago suggested to me a form of auger for boring through the impervious layer either directly from the upper surface or after first digging a shallow *thala*. The advantage of this method is that the impervious layer would be pierced and downward drainage obtained; the actual quantity of good earth to fill the holes would be comparatively small and possible extension of root development below the *bajri* and *pota* might be effected. The digging first of a shallow *thala* for the first two or three feet would probably be little more expensive than boring the same. But while it might facilitate the growth of the trees, it means more good earth in filling. On the other hand a hole simply of 12″ to 14″ in diamater from the surface means rather limited space unless the tree throws out naturally a distinct and lengthy top root as, for instance, a very common tree on the plains known as the *Jhand* or *Chounkra* (Prosopis spicigera), one exhibited in Paris in 1878 possessing a root 86 feet long having penetrated vertically 64 feet. A practical trial of boring a considerable number of holes has shown almost invariably 2 to 3 feet of *bajri*. The difficulty of passing through this with a cheap auger puts a different complexion on the case from what I had first hoped. Had the impervious layer been merely clay this might have been passed through rapidly, but on account of the *bajri* the cost runs to about 6 pies per foot. At this rate the commoner trees such as *Dhak, Babul Jhand,* &c., would hardly pay if no further results than their production was obtained, even allowing for the capacity of reproduction of coppice shoots in the first and last. But there is just the possibility that downward drainage may be set up by piercing the impervious layer and that the grazing properties might be increased or in some cases cultivation might become feasible. The attached statement of holes bored showing the thickness of different strata of soil met with up to sand and the depth at which this is reached may be of interest. Those made at the Aligarh station are in barren patches lying between fertile soil. In some cases in order to make a symmetrical plantation and to test differences in the strata the auger *thalas* have encroached somewhat into better land on the edge of the actual Usar. Some are noted in Dub grass (Cynddon Dactylon) patches, while others marked $\frac{\text{Culturable}}{\text{Usar}}$ or $\frac{\text{Dub}}{\text{Usar}}$ lie near the margin between the two. The holes have been filled up with earth and planted with different kinds of trees. Time alone can tell whether any tree likely to pay for the expense will succeed or if the piercing of the impervious layer will produce any beneficial effect on the soil above. But the experiment seems worth a trial; for as it opens up a way for root development and downward drainage, so it opens up a fresh course for attempting the partial reclamation of a very large area of land now very largely unproductive.

Auger thalas bored in the farm land at the Aligarh Agricultural Station showing the thickness of different strata of soil met with up to sand.

Row No.	Hole No.	Surface soil.		Thickness of *bajri*.	Thickness of *pota* (white clay).	Sand reached at—	Total depth of the hole	Remarks.
		Kind of soil.	Thickness.					
Row I.	1	Culturable ...	2′	3½′	1½′	7′	8′	
	2	Ditto ..	2′	3½′	1½′	7′	8′	
	3	Ditto ...	2′	3½′	1½′	7′	8′	
	4	Ditto ...	2′	3½′	1½′	7′	8′	
	5	Ditto ...	2′	3½′	1½′	7′	8′	

Auger thalas bored in the farm land at the Aligarh Agricultural Station, showing thickness of different strata of soil met with up to sand—(*concluded*).

Row No.	Hole No.	Surface soil. Kind of soil.	Surface soil. Thickness.	Thickness of *bajri*.	Thickness of *pota* (white clay).	Sand reached at—	Total depth of the hole.	Remarks.
	6	Culturable Usar ...	2′	4½′	1½′	8′	8½′	
	7	Usar ...	2′—9″	2′—3″	1′	6′	8½′	
	8	Do. ...	2′	2½′	3′	7½′	8½′	
	9	Do. ...	2′	3′	3′	8′	9½′	
	10	Do. ...	2′	3′	3½′	8½′	9½′	
	11	Do. ...	2′	3¼′	2¾′	8′	9′	
	12	Do. ...	2′—2″	2′—10″	2½′	7½′	9′	
	13	Do. ...	2′	2½′	3½′	8′	9′	
	14	Patch of Dub.	2½′	3½′	1½′	7½′	8′	
	15	Usar ..	2½′	1′—9″	2′	6¼′	7¼′	
	16	Do. ...	2′—9″	2′	1′	5¾′	6½′	
	17	Dub patch ...	2¼′	1¾′	1½′	5½′	7′	
	18	Dub Usar ...	2′	3′	...	5′	6′—9″	
	19	Dub patch ...	2½′	2¾′	...	5¼′	7′—2″	
	20	Usar ...	2′—2″	2′—4″	8″	5′—2″	5½′	
	21	Do. ...	2½′	2′—8″	...	5′—2″	5′—5″	
	22	Dub patch ...	2′—9″	2′—4″	...	5′—1″	5′—5″	
	23	Do. ...	4′—4″	6″	...	4′—10″	5′—4″	
	24	Do. ...	4′—2″	10″	...	5′	5½′	
Row II.	1	Usar ...	2′—9″	?′—9″	2′	8½′	9′—3″	The holes are 12 feet apart from each other.
	2	Do. ...	2′—9″	3′—9″	2′	8½′	9′—3″	
	3	Do. ...	3′—3″	1′—7″	3′—2″	8′	9′	
	4	Do. ...	2′—5″	2′—11″	2′—11″	8′—3″	9′	
	5	Do. ...	2′—2″	3′—7″	2′—11″	8′—8″	9′—6″	
	6	Do. ...	2′—5″	3′—4″	3′—2″	8′—11″	9′—9″	
	7	Do. ...	2′—3″	2′—9″	3′	8′	8′—7″	
	8	Do. ...	2′	3′—7″	2′—5″	8′	9′—2″	
	9	Do. ...	2′—7″	4′—5″	9″	7′—9″	8′—3″	
	10	Do. ...	1′—8″	3′—1″	3′—6″	8′—3″	8′—10″	
	11	Dub Usar ...	2′	2′—7″	2′—8″	7′—3″	7′—10″	
	12	Usar ...	2′—1″	3′—4″	2′	7′—5″	8′—1″	

Auger thalas bored in the Usar Reserve at Gursikhran, near Aligarh, showing the thickness of different strata of soil up to sand.

Row No.	Hole No.	Thickness of surface soil (Usar).	Thickness of *bajri*.	Thickness of *kánkar-silli*.	Thickness of *pota* (white clay).	Sand reached at—	Remarks.
1	1	2½′	...	...	5½′	8′	*Bajri* mixed with *pota*.
,,	2	2½′	...	...	5½′	8′	Do.
,,	3	2½′	...	...	5½′	8′	Do.
,,	4	2½′	...	...	5′	7½′	*Kankar* with *pota*.
,,	5	2½′	½′	...	4′	7′	Do.
,,	6	3′	1′	...	3½′	7½′	Do.
2	1	2½′	...	...	5½′	8′	*Bajri* with *pota*.
,,	2	2½′	...	...	5′	7½′	*Kankar* with *pota*.
,,	3	3′	1′	½′	4′	8½′	Do.
,,	4	3′	½′	...	4½′	8′	Do.
,,	5	3′	2′	...	3′	8′	Pure *pota*.
,,	6	3′	2′	...	3′	8′	Do.
3	1	3′	1′	...	4′	8′	Pure *pota*.
,,	2	3′	2′	...	3′	8′	Do.
,,	3	3′	1′	...	4′	8′	*Kankar* with *pota*.
,,	4	3′	1′	1′	3′	8′	Do.
,,	5	3′	2′	...	3′	8′	*Bajri* with *pota*.
,,	6	3′	2′	...	3′	8′	Do.

Auger thalas bored in the Usar Reserve at Gursikhran, near Aligarh, showing the thickness of different state of soil up to sand—(*concluded.*)

Row No.	Hole No.	Thickness of surface soil (Usar).	Thickness of *bajri*.	Thickness of *kankar* —*silli*.	Thickness of *pota* (white clay).	Sand reached at—	Remarks.
4	1	3′	2′	...	3½′	8½′	*Kankar* with *pota*.
,,	2	2½′	1½′	...	4½′	8½′	Pure clay.
,,	3	2½′	1½′	...	5′	9′	Do.
,,	4	2½′	2′	...	4′	8½′	Do.
,,	5	2½′	2′	...	3½′	8′	Do.
,,	6	2½′	2′	...	3½′	8′	*Pota* with fine *bajri*.
5	1	2½′	2′	...	3½′	8′	*Pota* with fine *bajri*.
,,	2	2½′	2′	...	3½′	8′	Do.
,,	3	2½′	2′	...	3½′	8′	Do.
,,	4	2½′	2′	...	4′	8′	Do.
,,	5	2½′	2′	...	4′	8′	Do.
,,	6	2′	2′	...	3′	7′	Do.

DATED CAWNPUR :
The 4th of September 1907.

J. M. HAYMAN,
Deputy Director of Agriculture,
United Provinces.

APPENDIX A.

Character of the Season and Rainfall.

The monsoon opened on the 10th of June, but the first falls between the 10th and 24th were insufficient for any agricultural start. A good rain on 25th put all ploughs to work and there was no difficulty in putting in seed. There was almost continuous rain and cloudy weather up to the 24th of August without injury to the crops, though perhaps a little too much for cotton. A break from this date to September 5th benefited the preparation of rabi land and the killing of weeds, and was just not too prolonged for the crops. The rain from the 5th to the 16th of September gave a good moist seed bed for the rabi, but the considerable falls towards the latter date did slight damage to cotton and very considerable injury to juar during its flowering stage, so that though the standing crops looked well the heads, in many cases, contained little or no grain. On the 9th of December a swarm of locusts (acridium perigrinum olive) passed over the agricultural station doing no damage.

During the rabi season the promising crops of wheat and *sarson* were very seriously damaged by wet weather in the latter part, the very rapid spread of rust towards the end causing the year to be one of the worst rusted known in this district for some time. The average outturn of wheat at the farm on an area of 13·81 acres was only about 6 maunds to the acre.

Rainfall recorded at the Government Agricultural Station, Aligarh.

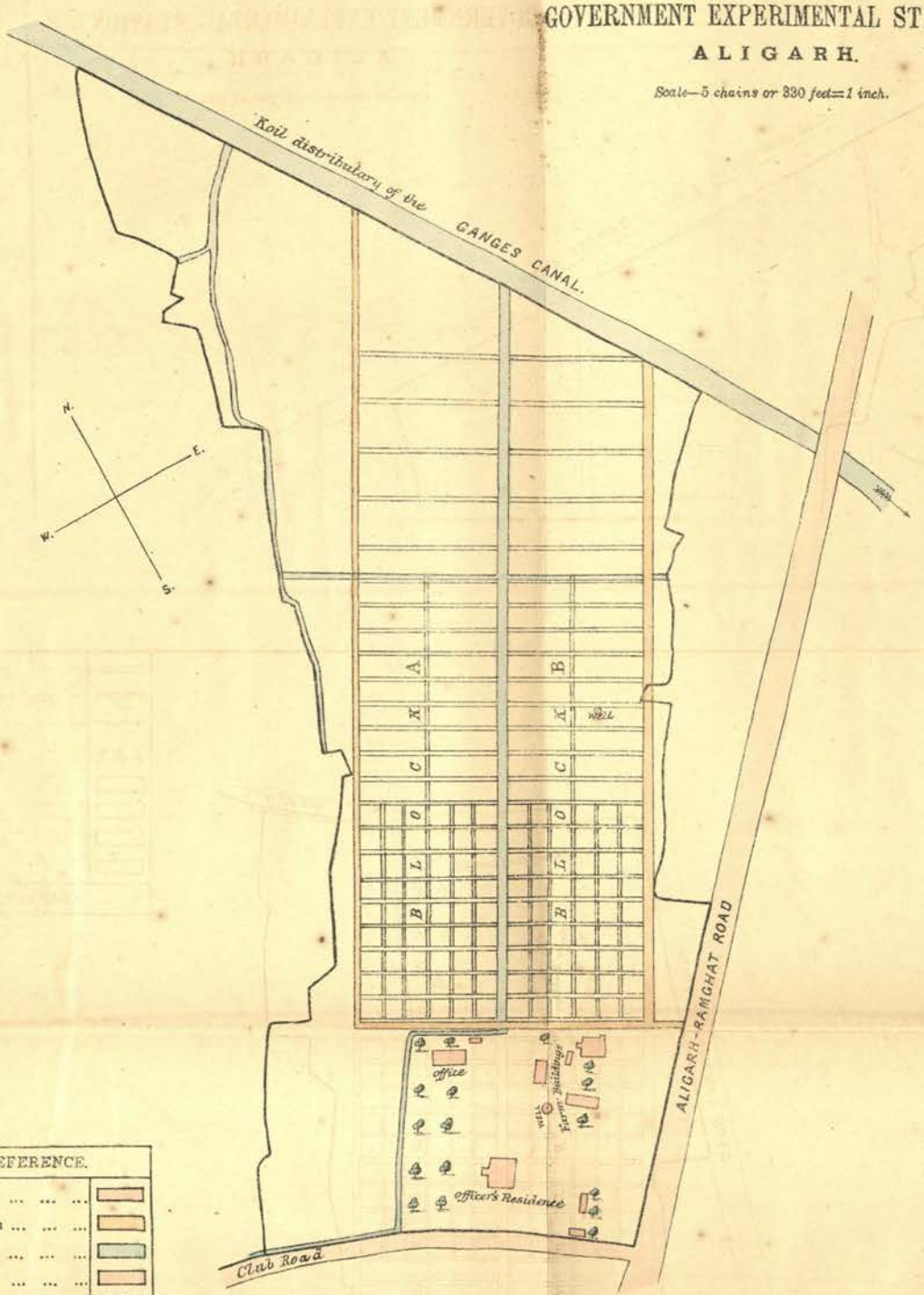
Date.	Rainfall.	Total per month.	Date.	Rainfall.	Total per month.
10th June 1906 ...	·03		5th September 1906 ...	1·63	
17th „ „ ...	·02		6th „ „ ...	·09	
19th „ „ ...	·02		8th „ „ ...	·36	
20th „ „ ...	·03		9th „ „ ...	·15	
21st „ „ ...	·01		10th „ „ ...	·51	
25th „ „ ...	2·47		11th „ „ ...	1·03	
27th „ „ ...	·19		12th „ „ ...	·29	
28th „ „ ...	1·36		13th „ „ ...	1·77	
29th „ „ ...	2·75		14th „ „ ...	0·19	
30th „ „ ...	·49	7·37	15th „ „ ...	1·99	
3rd July 1906 ...	·03		16th „ „ ...	·03	8·04
4th „ „ ...	·01		19th December 1906 ...	·21	·21
5th „ „ ...	·09		10th January 1907 ...	·48	·48
8th „ „ ...	1·02		6th February 1907 ...	·50	
13th „ „ ...	·44		7th „ „ ...	·75	
16th „ „ ...	·02		15th „ „ ...	·04	
21st „ „ ...	·04		17th „ „ ...	·16	
26th „ „ ...	·01		18th „ „ ...	·34	
28th „ „ ...	4·06		20th „ „ ...	·43	
29th „ „ ...	1·53		24th „ „ ...	·03	2·25
30th „ „ ...	1·22		16th March 1907 ...	1·70	
31st „ „ ...	·69	9·16	17th „ „ ...	·01	
1st August 1906 ...	·20		18th „ „ ...	·05	
2nd „ „ ...	·02		22nd „ „ ...	·08	1·84
5th „ „ ...	·03		11th April 1907 ...	·10	
6th „ „ ...	·19		16th „ „ ...	·02	
7th „ „ ...	·01		17th „ „ ...	·42	
8th „ „ ...	·23		25th „ „ ...	·02	
9th „ „ ...	·01		26th „ „ ...	·01	·57
10th „ „ ...	·24		26th May 1907 ...	·01	·01
11th „ „ ...	·20				
12th „ „ ...	·90				
20th „ „ ...	·22				
22nd „ „ ...	·04				
24th „ „ ...	·28	2·57			
			Total ...	...	32·50

SITE MAP

OF THE

GOVERNMENT EXPERIMENTAL STATION, ALIGARH.

Scale—5 chains or 330 feet=1 inch.



REFERENCE.

Pucca roads	
Kutcha roads	
Canal	
Buildings	
Trees	
Boundary	
Roads between plots ...	
Water courses	

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